## REMARKS

The Examiner is thanked for the due consideration given the application. This amendment is being filed concurrent with a Request for Continued Examination.

Claims 1, 3, 5, 6 and 10-12 are pending in the application. Independent claims 1, 5 and 10 have been amended to add the feature that the spatial co-ordinates of the object are determined using a structured light approach, in which the spatial co-ordinates are determined based on the distance between the projector and the relevant camera, as disclosed on page 4, last paragraph to page 5, first paragraph and on page 7, second paragraph of the specification, which is the English translation of the PCT application.

No new matter is believed to be added to the application by this amendment.

### Rejections Based On GENG

Claims 5 and 6 have been rejected under 35 USC §102(b) as being anticipated by GENG (U.S. Patent 6,028,672).

Claims 1-3 and 10-12 have been rejected under 35 USC §102(b) as being unpatentable over GENG in view of PETTERSEN et al. (U.S. Publication 2002/0048027).

These rejections are respectfully traversed.

The present invention pertains to determining spatial co-ordinates of an object that is illustrated, by way of example, in Figure 1 of the application, which is illustrated below.
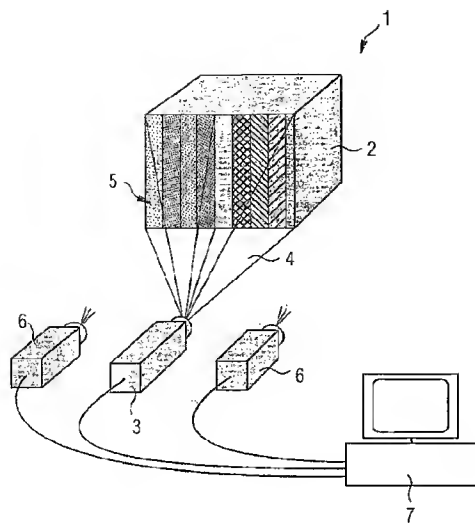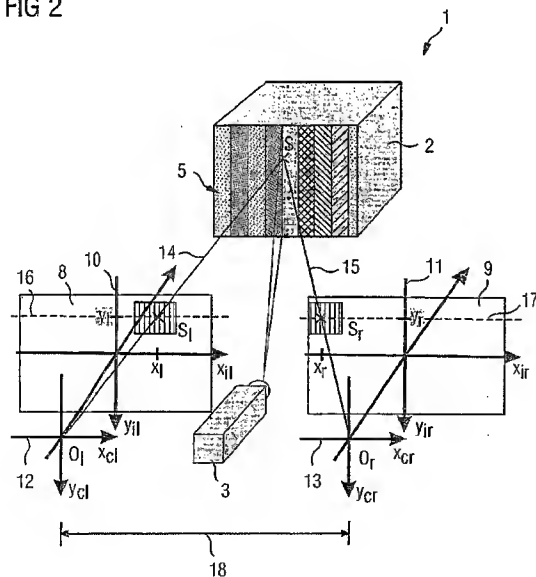
FIG 1



Figure 1 shows an object 2 being viewed by at least two cameras 6. The utilization of the special coordinates is exemplarily shown in Figure 2, which is reproduced below.

FIG 2



As shown, a projector (3) projects onto the object (2) a pattern (4) with known projection data. Object images (8) are created for triangulation. The pattern (4) contains redundant encoded projection data, and the data processing unit (7)

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restricts the search for corresponding image points ($S_l$, $S_r$) to problem areas in which an evaluation of the redundant data of the object images (8, 9) produces an erroneous result.

As is typically set forth in claim 5, the spatial co-ordinates of the object (2) from the object image (8) and the known projection data is determined *"using a structured light approach, in which the spatial co-ordinates of the object (2) are determined using the known distance between the projector (3) and the camera (6)."* See also independent claims 1 and 10.

GENG pertains to a high speed three dimensional imaging method. The Office Action refers to Figure 1 of GENG, which is reproduced below.
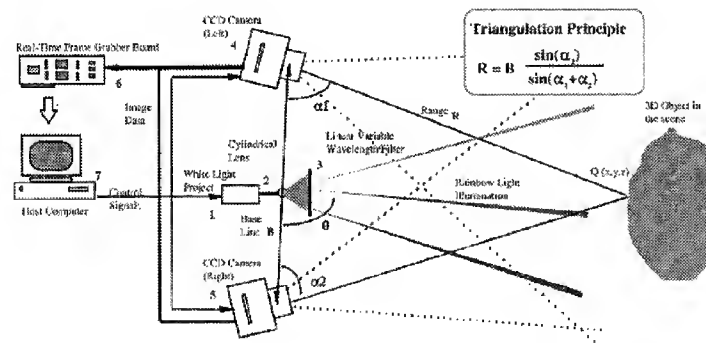


**Figure 1. Operation Principle of the Rainbow Stereo 3D Camera**

GENG teaches a method for determining spatial co-ordinates of the object, in which a rainbow color pattern is

projected onto an object and in which a camera creates an object image of the pattern projected onto the object.

However, GENG fails to use a structured light approach, in which the spatial co-ordinates of the object are determined based on the distance between the projector and a camera. GENG further fails to teach a method, in which additional spatial co-ordinates of the object are determined, if the spatial coordinates are determined incorrectly.

According to GENG, the color based stereo matching method and the intensity based stereo matching method are not used if one or the other method fails but the appropriate method is chosen before either method is applied by calculating an overall score as disclosed at column 10, lines 8 to 17. Thus, according to GENG, the color based stereo matching method and the intensity based stereo matching methods are used as alternatives depending on the structure of the object's surface.

In contrast to the teachings of GENG, claim 5 of the present invention is directed to a method, in which a triangulation is performed only if the structured light approach fails. Thus, no previous decision on which method to apply is taken in the method according to claim 5.

GENG thus does not anticipate claim 5 of the present invention.

Before addressing the unpatentability rejection over GENG and PETTERSEN et al. please consider the subject matter of independent claims 1 and 10.

Independent claims 1 and 10 are directed to a device and a method in which a pattern containing redundant encoded projection data is projected onto the object. Redundant encoded data are data that allow for the detection of errors (specification at page 6, last sentence). If an error is detected while performing the structured light approach, the process switches to a triangulation process, in which object images from both cameras are used for triangulating the spatial co-ordinates of the object.

For a better understanding of the claimed subject-matter the applicant departed here somewhat from the claim language.
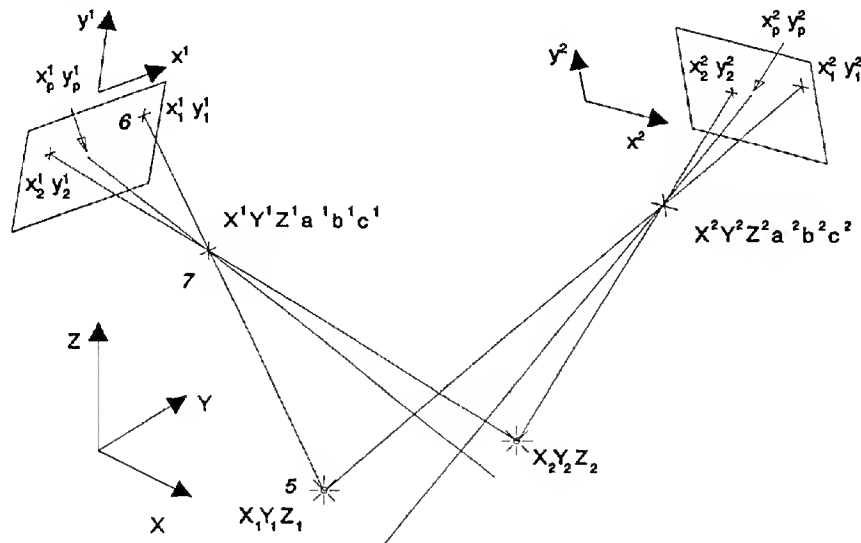
As already explained in connection with the discussion of claim 5, GENG fails to disclose using a structured light approach for determining spatial co-ordinates of the object.

In addition, GENG does not disclose determining additional spatial co-ordinates by a triangulation method in problem areas, in which an evaluation of the redundant data of the object image produces an erroneous result, since GENG does not evaluate redundant data of the object images, but computes a variance of intensity over a window area surrounding each pixel of the object image (see GENG at column 10, lines 8 to 11).

The use of redundant encoded projection data is also not disclosed in PETTERSEN et al.

The principle of the method used in PETTERSEN et al. is described in paragraphs [0024] and [0025], which refers to Figure 2 of the reference, which is reproduced below.

**Fig. 2 (Prior art)**



PETTERSEN et al. use two or more cameras in arbitrary and initially unknown positions and orientations relative to the same co-ordinate system. The spatial co-ordinates of an object point 5 are calculated by setting up a system of equations.  The unknowns of this equation system refer to the position and orientation of the cameras and the co-ordinates of the object point 5 as well as parameters for correction of possible lens distortions. Each additional point that is introduced in the calculation gives three additional unknown co-ordinates xyz to be

determined and 2n observations are included in the calculation, if n is the number of camera locations.

The calculation in PETTERSEN et al. further requires at least one distance between two points to be known to give correct scale information to the system of equations. Since the cameras are shifted to n locations, the system of equation is over-determined. Therefore, the least square method is used for solving for the spatial points of the object. The term redundant information refers therefore to the fact that the system of equation is over-determined and not to the redundant encoded projection pattern.

In addition, PETTERSEN et al. do not disclose the projection of any pattern at all.

One of ordinary skill and creativity would thus not produce a claimed embodiment of the present invention from a knowledge of GENG and PETTERSEN et al. A *prima facie* case of unpatentability has thus not been made.

These rejections are believed to be overcome, and withdrawal thereof is respectfully requested.

## Conclusion

Prior art of record but not utilized is believed to be non-pertinent to the instant claims.

The objections and rejections are believed to have been overcome, obviated or rendered moot. No issues remain. The issuance of a Notice of Allowability is accordingly respectfully solicited.

The Commissioner is hereby authorized in this, concurrent, and future submissions, to charge any deficiency or credit any overpayment to Deposit Account No. 25-0120 for any additional fees required under 37 C.F.R. § 1.16 or under 37 C.F.R. § 1.17.

Respectfully submitted,

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